

tales, in this well-known expedition, had charge of the deep-sea researches, while Dr. Steindachner with Agassiz, was responsible for the other zoological collections. The results of this expedition are well known to naturalists. The leisurely cruise along the coast of Patagonia and Chili gave Agassiz an opportunity of studying the glacial phenomena of South America. His stay in San Francisco and Sacramento gave an impulse of the greatest importance to education and science in these towns, and in the latter led to the creation of a Natural History Society, which was named after him, the Agassiz Institute.

The history of the Penikese School of Natural History must be so fresh in the memory of our readers that we need not here repeat the details. The success of the school, modelled somewhat after that of Dohrn, at Naples, exceeded all expectation, the accommodation being quite inadequate for the number of students who appeared. At the end of the first summer his pupils bade him a long good-bye in the hope of meeting their much-loved master next year. But the additional burden seems to have been too great for the strength of the never-resting devotee of science. After scarcely eight days' illness, he died at Cambridge, December 14, 1873, in his sixty-third year, in the height of his fame. He has been justly named by his fellow-citizens of the States the "Humboldt of America." Ever amiable and open in intercourse, stimulating and instructive, clear and concise in exposition, was Agassiz; and his numerous pupils, of whom several have developed into important workers in science, as Alex. Agassiz, Stimpson, Putnam, Shaler, Wilder, Morse, &c., clung to him with truly child-like love and respect. The news of his unexpectedly sudden death shocked the whole population deeply, for America had lost in him one of her citizens of whom she had the best right to be proud.

Besides Dr. Steindachner's paper, we would refer the reader who desires further details to a paper in the *Revue des Deux Mondes* for July and August, 1875.

WATERTON'S LIFE AND TRAVELS

Wanderings in South America, the North-West of the United States, and the Antilles, in the Years 1812, 1816, 1820, and 1824. With Original Instructions for the Perfect Preservation of Birds, &c., for Cabinets of Natural History. By Charles Waterton. New Edition. Edited, with Biographical Introduction and Explanatory Index, by the Rev. J. G. Wood. With 100 Illustrations. (London : Macmillan and Co., 1879.)

THE reading world will feel grateful to both author and publisher for this handsome edition of one of our classical books of travel and natural history; while those who are already familiar with the work will read with interest and pleasure the excellent biographical notice of Waterton here given. We have first a sketch of his school and college life, when his taste for natural history got him into many scrapes; but we learn that the Jesuit fathers at Stonyhurst wisely utilised his irrepressible love of animals by making him rat-catcher and general vermin-killer to the establishment. We next find him travelling on the Continent, where he had a narrow escape of dying of the plague at Malaga. He visited Gibraltar, and saw a whole colony of the well-known apes which were then far more abundant than now. He speculates on the "tremendous convulsion of nature" which had

opened the channel of the Straits, observing that—"if apes had been on Gibraltar when the sudden shock occurred, these unlucky mimickers of man would have seen their late intercourse with Africa quite at an end"—a passage which recalls to us those extreme catastrophist doctrines in geology which are now happily extinct.

When his wanderings in South America were at an end he settled down in his ancestral Yorkshire home, Walton Hall, devoting himself to the management of his estate and the study of nature, and living a life of the most Spartan simplicity. His single room had neither bed nor carpet. He always lay on the bare boards with a blanket wrapped round him, and with an oaken block by way of pillow. He went to bed at eight, and was up, dressed and clean shaven every morning at four, having himself lit a fire and boiled water to shave with. His devotions and reading occupied him till six; his bailiff's report, writing and business till eight, his breakfast hour; so that he had done a fair day's work before most people are out of bed. His room was at the very top of the house; he never touched fermented liquors, and took very little meat.

His great delight was in studying the habits of birds and other wild animals; and he devoted his park of over 250 acres to this purpose. He had moats, and ponds, and swamps, woods and trees of all kinds; and he spent 10,000*l.* in surrounding the whole with a wall nowhere less than eight feet high, in order to keep out poachers and animal intruders. In this domain no gun was ever fired or anything done to disturb the feathered inhabitants. The very year after the wall was finished the herons came and established themselves in the park, where they had never bred before; and, as Mr. Wood remarks, it is strange that they should have known that the wall, which they themselves could so easily pass, would be any protection to them. He constructed a yew fortress for pheasants, built a cat-proof tower for starlings, and a lofty dovecot to secure his pigeons from poachers. Owls and titmice and many other birds had special haunts constructed for them, while rats and other bird-enemies were carefully trapped or poisoned.

Waterton was one of the kindest and most humane of men. He studied the comforts of his horses, his dogs, and even of his pigs, as if they had been human beings. He had his gates specially constructed so that his horses and cows could lean over them and converse together, without inconvenience to themselves or injury to the gates. When he took possession of a deserted country house in Demerara, tenanted by frogs and snakes, owls and vampires, he tells us in his quaint language,—"The frogs, and here and there a snake, received that attention which the weak in this world generally experience from the strong, and which the law commonly denominates an ejectment. But here neither the frogs nor serpents were ill-treated; they sallied forth, without buffet or rebuke, to choose their place of residence; the world was all before them. The owls went away of their own accord, preferring to retire to a hollow tree rather than to associate with their new landlord. The bats and vampires stayed with me, and went in and out as usual." Even when, going down the St. Lawrence, he caught, crawling on his neck, the only bug he saw in North America, he "thought of my uncle Toby and the fly;" and so, instead of killing it, he "quietly chucked it among some baggage that was

close by, and recommended it to get ashore by the first opportunity."

Any wild animals that he does not actually want for specimens he treats in the same way, and it is therefore not surprising that he looks favourably on the Indian and his mode of life. Ignorant travellers and colonists call the Indians a lazy race; "but," he remarks, "man in general will not be active without an object. When an Indian has got plenty to eat, what need has he to work? He has no idea of making pleasure-grounds. Money is of no use to him as there are no markets for him to go to, nor milliners' shops for his wife and daughters. He has no taxes to pay, no highways to keep up, no poor to maintain, no army nor navy to supply. He lies in his hammock both night and day (for he has no chair nor bed, neither does he want them), and in it he forms his bow, and makes his arrows, and repairs his fishing-tackle. But when his provisions are gone he rouses himself, and scours the forest in quest of food. He plunges into the river after the deer and tapir, or passes through swamps and quagmires, and never fails to obtain food. Should the approach of night check him while hunting, he lays him down in the forest and continues the chase the next morning till he is successful. With us the poor or needy man has to work every day and all day long for a maintenance, but should this man acquire a fortune he usually changes his habits." Waterton then amusingly sketches for us the life of an idle man for a single day, and concludes:—"Now, could the Indian in his turn see this, he would call the white men a lazy, indolent set. Perhaps, then, upon due reflection, you would draw this conclusion: that men will always be indolent when there is no object to rouse them."

Not even Gilbert White was a closer or more accurate observer of the habits of animals than was Waterton, and had he recorded all his observations during the forty years he lived at Walton Hall we should have had a work in no way inferior to White's "Selborne." There is one curious observation of his which throws some light on the origin of one of the superstitions of natural history, but which seems to have been entirely overlooked. The name *Caprimulgus*, or "goat-sucker," has its equivalent in many European languages; and the belief that this bird sucked goats or cows has been prevalent since the time of Aristotle. The only foundation for this widespread belief, suggested in any ornithological book to which I have access, is, that the goat-sucker is often found near sheep-folds and cattle-pens on account of the abundance of insects in such places. Pliny however says that they enter the folds and fly to the udders of the goats in order to suck the milk. This is a much more definite statement, and, strange to say, Waterton supports the fact thus stated by his own observation, and at the same time shows how the erroneous *inference* arose from this fact. At p. 233 of this volume we find the following:—"I am fully persuaded that these innocent little birds never suck the herds; for when they approach them, and jump up at their udders, it is to catch the flies and insects there. When the moon shone bright I would frequently go and stand within three yards of a cow, and distinctly see the *caprimulgus* catch the flies on its udder." The passages marked in italics are most remarkable, since they directly confirm Pliny's statement that the birds "fly

to the udders of the goats." It is not quite clear by the context whether Waterton made this observation in Demerara or in England. He is describing the habits of the Demerara goat-suckers at the time, but as he has said nothing about there being any cows on the deserted estate where he was staying, he may in this passage be referring to his observations at home.

In another passage at p. 198 this is certainly the case. He says (according to his custom addressing his reader as if speaking to him):—

"When the moon shines bright you may have a fair opportunity of examining the goat-sucker. You will see it close by the cows, goats, and sheep, jumping up every now and then under their bellies. Approach a little nearer,—see how the nocturnal flies are tormenting the herd, and with what dexterity he springs up and catches them, as fast as they alight on the belly, legs, and udder of the animals. Observe how quiet they stand, and how sensible they seem of his good offices, for they neither strike him, nor hit him with their tail, nor tread on him, nor try to drive him away as an uncivil intruder."

There can be no doubt that these are Waterton's own observations at home, though expressed rather generally; but the other passage, at all events, written in the first person, is far too definite a statement to be doubted, coming from such an observer; and it is curious that no modern writer on the subject appears to have referred to it.

As a capturer of snakes Waterton was pre-eminent, his fight with the great boa constrictor, and his capture single-handed of a smaller one, which he allowed to coil round his body while he held its neck in his two hands, are well-known incidents in his "Wanderings;" but Mr. Wood tells us how he coolly manipulated live rattlesnakes in the presence of a number of friends at Leeds, transferring them from one box to another with his bare hands. His secret was, simply, that if a snake is not frightened by noise or sudden movements, its natural sluggishness prevents it from resenting cautious handling.

We quite agree with the editor that few books have ever been written so thoroughly truthful and accurate, and so entirely free from exaggeration as those of Waterton; yet his veracity was often doubted by his reviewers, and he was classed among travellers of the Munchausen type. This however he little cared for, but he did not like to be called eccentric. He thought himself the most ordinary of human beings, though he climbed trees barefoot and never in his life wore a black coat. "Yet," as Mr. Wood well says of him, "had he not been eccentric he would not have been the Charles Waterton so long known and loved. . . . It was eccentric to come into a large estate as a young man, and to have lived to extreme old age without having wasted an hour or a shilling. It was eccentric to give bountifully and never allow his name to appear in a subscription list. It was eccentric to be saturated with the love of nature. It might be eccentric never to give dinner-parties, preferring to keep an always open house for his friends; but it was a very agreeable kind of eccentricity. It was eccentric to be ever childlike but never childish. We might multiply instances of his eccentricity to any extent, and may safely say that the world would be much better than it is if such eccentricity were more common."

So far we have had only praise for this book, and

though we have said nothing yet about the illustrations, they are also worthy of commendation as really illustrating the matter in hand, and being for the most part of excellent quality. But now we have the less pleasant duty of finding fault. Waterton had a strong prejudice against the use of scientific names. He tells us that the *Salempenta* is excellent eating; that you hear the voice of the *Hannaquoi* at early dawn; while such words as *Conanacouchi*, *Labarri*, and *Karabimiti* are continually used without any explanation of their meaning. In pursuance of his duty as editor Mr. Wood undertakes to clear up all these points, and to make the path easy both for the general reader and the scientific naturalist; and he does this by means of an "Explanatory Index," which occupies nearly one-third of the volume, and of which he says in his preface that he believes "there is not a single living creature or tree mentioned by Waterton concerning which more or less information cannot be found in this Index."

The index referred to does undoubtedly contain a great deal of useful and interesting information, but it is also full of the most extraordinary and misleading errors, which seem to show that Mr. Wood participates in his old friend's contempt for scientific names, since he evidently thinks accuracy in these names of little importance. First we have several completely obsolete names given, which the reader would in vain look for in any modern book on natural history; such as *Champsia* for *Alligator*, and *Arapunga* instead of *Chasmorhynchus* as the name of the bell-bird. Then we find misspelt or misplaced names; as *Deroptyus coronatus* instead of *Deroptyus accipitrinus* for the name of the sun-parrot, and *Helias eurypyga* instead of *Eurypyga helias* for the sun-bittern. More important are the completely wrong identifications of species, or the mixing together of two quite different animals. The ant-thrushes are said to belong to the genus *Pitta*, which is eastern, whereas they form a peculiar American family, *Formicariidae*. The feathers of the "wild turkey," a bird which does not exist in South America, are said to be used by the Indians of Demerara. The "hannaquoi," or motmot, is said to be named *Ortalida motmot*, and the description mixes up the real motmot (*Momotus*) and the gallinaceous *Ortalida*, saying that the eggs are blue and that the bird can be easily tamed and feeds with the poultry; which is certainly not true of the motmot, of which a figure is given, and which is a solitary forest bird whose eggs are white and which never walks on the ground. The "kurumann" wax is said to be produced by a wild bee named *Ceroxylon audicola*, which is the name of the wax-palm of the Andes. The name of the "coral-snake" is given as *Tortrix scytale*, whereas the species belongs to a quite distinct family, being either an *Elaps* or a *Pliocerus*; while the deadly "labarri" snake is named *Elaps lemniscatus*, though, from the description Waterton gives, it is almost certainly a *Craspedocephalus*. The red grosbeak, which Waterton mentions as a rarity he was long in search for and gives a recognisable description of, is called *Cardinalis virginianus*, a bird not found in Demerara; whereas it is almost certainly the *Pitylus erythromelas*. The little tiger-bird is said to be a *Tigrisoma* or tiger-bittern; but Waterton's description shows it to be *Capito cayanensis*, a fruit-eating bird of a totally distinct family.

The "yawaraciris" are said to be manakins of the genus *Pipra*; but the description in the text clearly points to the well-known "blue creepers" of the genus *Coereba*. The jay of Guiana described by Waterton, and which Mr. Wood could not determine, is the *Cyanocorax cayanus*, while the "grand gobe-mouche," which is omitted from the index, is easily recognisable as the *Querula rubricollis*. Of the plant identifications I am not prepared to speak, except to remark that the cultivated pineapple is certainly not a species of *Pitcairnea*.

It is to be hoped that this delightful work will come to a second edition, and admit of these blemishes being removed. It would also be a great convenience if references were added to the explanatory index, to avoid the trouble of first going to the index proper and then back to the body of the work. These, however, are matters which, though important to the student who keeps the book for reference, will not much affect the enjoyment of the general reader; and I can therefore cordially recommend all who have not made the acquaintance of the "Wanderer" to do so in the pages of the present volume.

A. R. W.

OUR BOOK SHELF

Ueber ehemalige Strandlinien in anstehendem Fels in Norwegen. Dr. R. Lehmann. (Halle, 1879.)

PROBABLY no feature of Scandinavian geology has been more frequently discussed than the remarkable lines of terrace which have been traced along the slopes of the coast, even up into the far northern fjords. Certainly no stranger, even if ignorant of geology, can visit these regions without being impressed by the freshness and persistence of these "parallel roads," which wind in and out among the intricate navigation of strait and sound, islet and archipelago. From the time of Celsius downwards a continually increasing literature has been devoted to this subject, and now Dr. Lehmann, of the Realschule, in Halle, adds another essay to the pile. He discusses at length and rejects the theories of erosion by glaciers and by floating ice, and adopts that of breaker-action. But probably no exclusive theory is correct. Unquestionably Norway has been overridden by land-ice, scarped and notched by coast-ice, as well as cut into by tides and breakers. That the terraces mark lines of former sea-level seems so self-evident that it hardly deserves more than a simple mention of the fact. But when these lines were cut out of the rock and the land was a hundred feet or more lower than it is now, the coasts were doubtless cumbered with ice, and while the breakers were grinding out a platform from the solid rock, their work was probably expedited by drifting masses of floe-ice. Dr. Lehmann's pamphlet is useful for the collected references it contains to recent literature on the subject. But it is needlessly voluminous.

Die Lust an der Musik. Erklärt von H. Berg. B. Behr's Buchhandlung. (Berlin, 1879.)

THIS is a little pamphlet which we have perused with no small amount of disappointment. After a short chapter treating of the origin of music, in which the author merely recapitulates the theory expounded by Darwin long ago, we come to Chapter II., on the development of music, in which the author states very little that has not before been stated by Darwin, and particularly by Helmholz, in his "Lehre von den Tonempfindungen." The principal chapter, viz., that on the effects of music, in which we expected to find the explanation promised in the title of the pamphlet, or at least the expression of some new ideas on the subject, occupies but four small